Before running the codes followings need to be installed.

- Python programming language using version 3.9.13.
- TensorFlow 2.11.0
- sys 3.9.13, cv2 4.8.0
- Numpy 1.26.0,
- Pandas 1.4.4
- Matplotlib 3.5.2
- sns 0.11.2
- Scikit-Learn 1.0.2
- Time
- Collections.

Futrher we have provided a sequential guideline to evaluate the models.

Dataset:

The initial datasets can be accesses using the following links:

NASA: https://www.kaggle.com/datasets/vinayak123tyagi/bearing-dataset

CWRU: https://www.kaggle.com/datasets/brjapon/cwru-bearing-datasets

Preprocessing:

NASA:

Step1:

The initial defects points within the raw vibrational signals need to be identified using the highest peaks sequence evaluation for dataset1 bearing 3, dataset1 bearing 4, and dataset 2 bearing 1. This detection is based on the expected fault frequency of each defect.

Expected frequency for dataset1 bearing 3: 296.8

Expected frequency for dataset1 bearing 4: 280.4

Expected frequency for dataset2 bearing1 : 236.4

Step2:

In the next step, Frequency spectrum, polar spectrum, spectrogram and statistical features are created and saved separately for dataset1 bearing 3, dataset1 bearing 4, and dataset 2 bearing 1 within NASA dataset.

CWRU:

The datasets are already labeled. In this step we transform the raw vibration into the chuncks and transform each chunck to Frequency spectrum, polar spectrum, spectrogram and statistical features.

Models:

Two types of model are created: dual channel and single channel.

Single channel:

Six models exist in this folder. We can evaluate the models based on the generated images from the preprocessing steps.

Dual channel:

Six models exist in this folder. We can evaluate the models based on the generated images and statistical features from the preprocessing steps.